

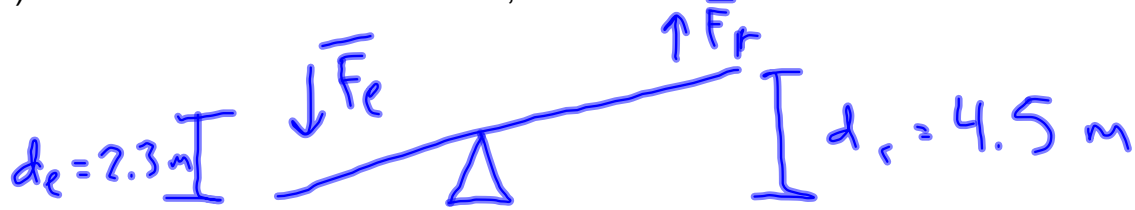
TEST, Thursday, 11/3

## Simple Machine Notes and Practice Problems 4th Block 10.31.11

A certain seesaw-like device is constructed so that one side is pushed downward over 2.30 m, the other side is lifted 4.50 m. Draw and label this machine.

a) What is the IMA of this machine?

b) If this machine is 70.0% efficient, what is the AMA?



$$a) \text{ IMA} = \frac{d_e}{d_r} = \frac{2.3 \text{ m}}{4.5 \text{ m}} = 0.51$$

$$b) \text{ Eff} = \frac{\text{AMA}}{\text{IMA}} (100\%)$$

$$\text{AMA} = \frac{(\text{IMA})(\text{Eff})}{100\%}$$

$$= \frac{(.51)(70\%)}{100\%}$$

$$= .358$$

## Pulley Activity Results:

When increasing the number of pulleys, what happens to the following variables:

- $F_e$ ? Increase
  - $d_e$ ? Stayed the same
  - IMA? Stay same
  - AMA? decreased
  - Efficiency? decrease
- For movable pulleys,  
$$IMA = \# \text{ pulleys}$$

An armadillo bites and pulls down with a force of 40.4 N as he tugs a rope in a pulley system over a distance of .650 m. As a result, a 3.55 kg basket full of rocks lifts .250 m.

- Calculate the AMA of the system.
- Calculate the IMA of the system.
- How efficient is this simple machine?

$$F_e = 40.4 \text{ N} \quad F_r = 34.7 \text{ N}$$

$$d_e = .65 \text{ m} \quad d_r = .25 \text{ m}$$

$$a) \text{ AMA} = \frac{F_r}{F_e} = \frac{34.7 \text{ N}}{40.4 \text{ N}} = .861$$

$$b) \text{ IMA} = \frac{d_e}{d_r} = \frac{.65 \text{ m}}{.25 \text{ m}} = 2.6$$

$$c) \text{ Eff} = \left( \frac{\text{AMA}}{\text{IMA}} \right) (100\%) = \left( \frac{.861}{2.6} \right) (100\%) = 33.1\%$$

You must pull a rope connected to a pulley a distance of 6.99 m to accomplish a certain task. If this simple machine is 85.8% efficient, with how much force will you have to pull down to have the machine do 444 J of work for you?